High Density Polyethylene Super Gripnet® Liner

Product Data

Property	Test Method	Values			
Thickness (min. ave.), mil (mm)	ASTM D5994*	50 (1.25)	60 (1.5)	80 (2.0)	100 (2.5)
Thickness (lowest indiv.), mil (mm)	ASTM D5994*	50 (1.25)	54 (1.35)	72 (1.8)	90 (2.25)
***The thickness values may be changed due to project specifications (i.e., absolute minimum thickness)**					
Drainage Stud Height (min. ave.), mil (mm)	GRI GM12/ASTM D7466	145 (3.68)	145 (3.68)	145 (3.68)	145 (3.68)
Friction Spike Height (min. ave.), mil (mm)	GRI GM12/ASTM D7466	175 (4.45)	175 (4.45)	175 (4.45)	175 (4.45)
Density, g/cc, minimum	ASTM D792, Method B	0.94	0.94	0.94	0.94
Tensile Properties (ave. both directions)	ASTM D6693, Type IV				
Strength @ Yield (min. ave.), lb/in width (N/mm)	2 in/minute	95 (16.6)	114 (20.0)	152 (26.6)	190 (33.3)
Elongation @ Yield (min. ave.), % (GL=1.3in)	5 specimens in each direction	13	13	13	13
Strength @ Break (min. ave.), lb/in width (N/mm)		105 (18.4)	126 (22.1)	168 (29.4)	210 (36.8)
Elongation @ Break (min. ave.), % (GL=2.0in)		200	200	200	200
Tear Resistance (min. ave.), lbs. (N)	ASTM D1004	38 (169)	40 (178)	53 (236)	64 (285)
Puncture Resistance (min. ave.), lbs. (N)	ASTM D4833	80 (356)	90 (400)	120 (534)	150 (667)
Carbon Black Content (range in %)	ASTM D4218	2 - 3	2 - 3	2 - 3	2 - 3
Carbon Black Dispersion (Category)	ASTM D5596	Only near spherical agglomerates			
	for 10 views: 9 views in Cat. 1 or 2, and 1 view in Cat. 3				
Stress Crack Resistance (Single Point NCTL), hours	ASTM D5397, Appendix	300	300	300	300
Oxidative Induction Time, minutes	ASTM D3895, 200°C, 1 atm O_2	≥100	≥100	≥100	≥100
Melt Flow Index, g/10 minutes	ASTM D1238, 190°C, 2.16kg	≤1.0	≤1.0	≤1.0	≤1.0
Oven Aging	ASTM D5721	80	80	80	80
with HP OIT, (% retained after 90 days)	ASTM D5885, 150°C, 500psi O_2				
UV Resistance	GRI GM11	20hr. Cycle @ 75°C/4 hr. dark condensation @ 60°C			
with HP OIT, (% retained after 1600 hours)	ASTM D5885, 150°C, 500psi O_2	50	50	50	50

These product specifications meet or exceed GRI's GM13

Supply Information (Standard Roll Dimensions)

Thickness		Width		Length		Area (approx.)		Weight (average)*	
mil	mm	ft	m	ft	m	ft^2	m^2	lbs	kg
50	1.25	23	7	300	91.435	6,900	640.05	2,800	1,270.06
60	1.5	23	7	300	91.435	6,900	640.05	2,900	1,315.42
80	2.0	23	7	300	91.435	6,900	640.05	3,100	1,406.14
100	2.5	23	7	300	91.435	6,900	640.05	4,000	1,814.40

Notes:

All rolls are supplied with two slings. All rolls are wound on a 6 inch core. Special lengths are available on request. All roll lengths and widths have a tolerance of ±1%
**The weight values may change due to project specifications (i.e. absolute minimum thickness or special roll lengths) or shipping requirements (i.e. international containerized shipments).*

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Linear Low Density Polyethylene
Super Gripnet® Liner

Product Data

Property	Test Method	Values			
Thickness (min. ave.), mil (mm)	ASTM D5994*	50 (1.25)	60 (1.5)	80 (2.0)	100 (2.5)
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Drainage Stud Height (min. ave.), mil (mm)	GRI GM12/ASTM D7466	145 (3.68)	145 (3.68)	145 (3.68)	145 (3.68)
Friction Spike Height (min. ave.), mil (mm)	GRI GM12/ASTM D7466	175 (4.45)	175 (4.45)	175 (4.45)	175 (4.45)
Density, g/cc, maximum	ASTM D792, Method B	0.939	0.939	0.939	0.939
Tensile Properties (ave. both directions)	ASTM D6693, Type IV				
Strength @ Break (min. ave.), lb/in width (N/mm)	2 in/minute	105 (18.4)	126 (22.1)	168 (29.4)	210 (36.8)
Elongation @ Break (min. ave.), % (GL=2.0in)	5 specimens in each direction	300	300	300	300
Tear Resistance (min. ave.), lbs. (N)	ASTM D1004	30 (133)	40 (178)	53 (236)	67 (298)
Puncture Resistance (min. ave.), lbs. (N)	ASTM D4833	55 (245)	70 (311)	90 (400)	110 (489)
Carbon Black Content (range in %)	ASTM D4218	2 - 3	2 - 3	2 - 3	2 - 3
Carbon Black Dispersion (Category)	ASTM D5596	Only near spherical agglomerates for 10 views: 9 views in Cat. 1 or 2, and 1 view in Cat. 3			
Oxidative Induction Time, minutes	ASTM D3895, 200°C, 1 atm O_2	≥100	≥100	≥100	≥100
Melt Flow Index, g/10 minutes	ASTM D1238, 190°C, 2.16kg	≤1.0	≤1.0	≤1.0	≤1.0
Oven Aging	ASTM D5721	60	60	60	60
with HP OIT, (% retained after 90 days)	ASTM D5885, 150°C, 500psi O_2				
UV Resistance	GRI GM11	20hr. Cycle @ 75°C/4 hr. dark condensation @ 60°C			
with HP OIT, (% retained after 1600 hours)	ASTM D5885, 150°C, 500psi O_2	35	35	35	35
2% Secant Modulus (max.), lb/in. (N/mm)	ASTM D5323	3000 (520)	3600 (630)	4800 (840)	6000 (1050)
Axi-Symmetric Break Resistance Strain, % (min.)	ASTM D5617	30	30	30	30

These product specifications meet or exceed GRI's GM17

Supply Information (Standard Roll Dimensions)

Thickness		Width		Length		Area (approx.)		Weight (average)*	
mil	mm	ft	m	ft	m	ft^2	m^2	lbs	kg
50	1.25	23	7	300	91.435	6,900	640.05	2,800	1,270.06
60	1.5	23	7	300	91.435	6,900	640.05	2,900	1,315.42
80	2.0	23	7	300	91.435	6,900	640.05	3,100	1,406.14
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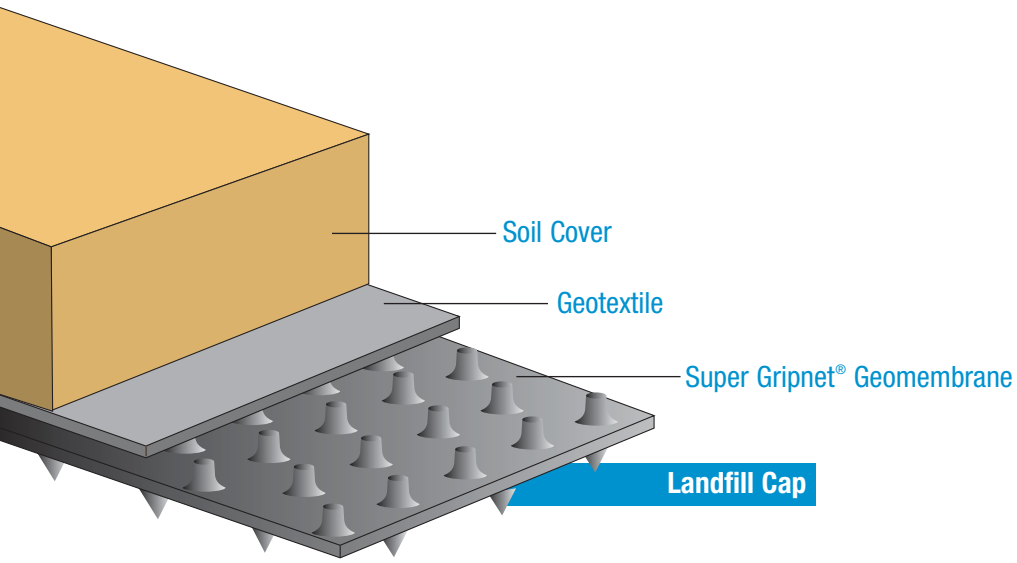
Super Gripnet® Geomembrane

Applications for HDPE and LLDPE Agru Super Gripnet® include projects where drainage and high interface friction as well as cost savings are critical i.e. landfill caps, landfill slopes and mining reclamation projects. Recent bids for installations have indicated cost savings of over $3,000.00 per acre with the use of Super Gripnet® as a replacement for traditional geocomposite overlying a textured geomembrane.

Agru America's structured geomembranes are manufactured on state-of-the-art manufacturing equipment using a flat cast extrusion manufacturing process as opposed to blown film extrusion. Agru America uses only the highest grade of HDPE and LLDPE resins manufactured in North America. The structured geomembrane is manufactured by a continuous horizontal flat die extrusion into profile rollers. The machined rollers give the product the final structured surface with drainage studs and spikes which are an integral (homogenous) part of the liner and have a smooth edge for on site welding. This process provides a consistent core thickness resulting in higher sheet tensile strength, consistent high profile texturing resulting in higher interface friction capabilities as well as consistent drain capacity.



Interface Shear – Cap Loading Conditions ASTM D 5321

Soil/Grip Liner Surface	P	LD
Coarse Sand	35°	31°
Glacial Till	38°	34°
Silty Sand	28°	26°
Non Woven GT	31°	26°

Soil/Drain Liner Surface with GT		
Coarse Sand	30°	30°

Note: The above values are representative friction angles only. It is recommended that site specific conformance testing be carried out using the actual soils, geosynthetics and loading conditions for a specific project.

P = Maximum or Peak Interface Shear Value in degrees
LD = Large Displacement Interface Shear Value in degrees
GT = Geotextile

Super Gripnet® Geomembrane

- Combines Drainage with Shear Resistance
- High Water Flow Rate on Top Side
- Spike/Texture Bottom
- Consistent Drain and Structure Pattern
- Combine with Smooth
- Combine with Fabric

US Patent - No. 5.258.217

The machine rollers provide the final structured surface with a 3.6 mm (0.145 in.) high studded drain surface on the top side and 4.4 mm (0.175 in.) high spiked friction surface on the bottom side. The 7 m (23 ft.) wide rolls of finished product include a smooth edge on both sides of the roll for ease of thermal welding in the field. Due to the molded structure, core thickness does not vary as with blown film textured sheet, thus mechanical properties of the sheet are not affected. In addition, the consistent high profile texture insures optimum interface friction characteristics at any point on the sheet surface.

The top surface integral drain structure consists of 3.2 mm (0.13 in.) diameter studs 3.6 mm (0.145 in.) in height and spaced on a diamond pattern of 12.5 mm (0.5 in.) spacing. A filter/protection geotextile is required to be placed on the drain profile. The geotextile is heat set on one side (placed against the drain structure) to reduce intrusion into the drain. Large-scale flow rate testing with this configuration, overlying soils and expected normal loads resulted in high planar flow rates.

The bottom spiked friction surface with 4.4 mm (0.175 in.) high spikes and patterned texture provides maximum interface friction and high factor of safety against sliding.

Thus, the Super Gripnet® Liner is a synthetic drainage media which has decided advantages over conventional geocomposites:

- ***Cost Savings*** – The drain media and liner are one and installed as one panel
  – No waste due to fitting of geocomposite sections or discarding roll ends
- ***Improved Planar Flow*** – Less reduction for chemical/biological clogging considerations
- ***Consistent Material*** – Studs and spikes (drainage and friction) totally integrated with the geomembrane
- ***High Interface Shear*** – Exceptional shear resistance between soil & geotextile components allows flexibility and stability during protective cover material placement
- ***Meets/exceeds Project Requirements*** – Excellent fluid barrier
  – Excellent drainage medium
  – Excellent friction characteristics

Agru's Super Gripnet® geomembrane is a high performance liner system with integrated top surface drainage supplying the functional needs for any project with the added benefit of substantial cost savings.

Why specify or use anything else!

Agru has over 20 years experience with Geomembranes and 50 years experience with Thermoplastic Extrusion Agru offers a wide range of concrete protective liners (Sure Grip), pipe fittings and semi-finished materials.

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